

The Spread That Isn't: Natural Gas And Crude Oil

While young ladies who have been on the dating scene too long might disagree, just because two things smell bad, often come from the same place and have overlapping uses does not mean they are equivalent.

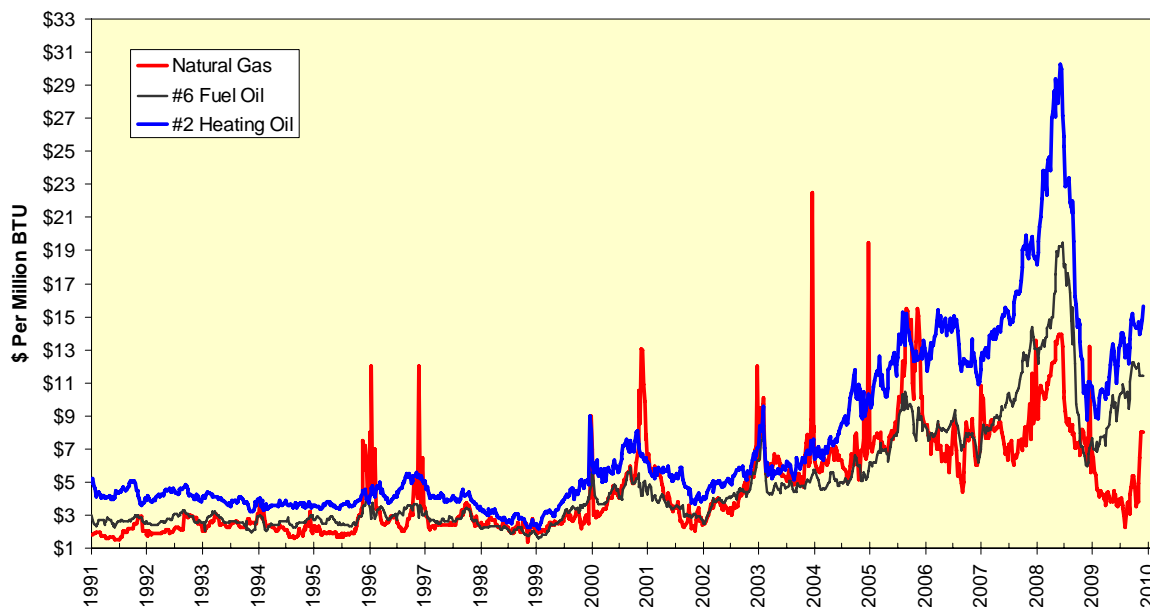
Such clearly describes the relationship between natural gas and crude oil. While many of the original discoveries of natural gas were associated with drilling for the then more valuable crude oil and while both are hydrocarbons, most natural gas discoveries in recent years were made deliberately without a crude oil association. These include deep natural gas deposits in reservoirs too hot for crude oil, tight sands and shale. The largest known source of methane on the planet, seabed hydrates, have no association with crude oil at all.

Burner Tip Parity

What always will exist, however, is a mental association between the two markets. Much of this goes back to the 1970s and the natural gas deregulation debate. The assumption was natural gas prices would rise to converge with the price of competing fuels at the final user site on a BTU-equivalent basis. Please note this does not mean comparing the futures price of crude oil, a feedstock not consumed directly, at Cushing, Oklahoma, to the futures price of natural gas at the Henry Hub in Louisiana. The prices paid in final markets for both refined petroleum products and for natural gas differ widely on the bases of geography, refining costs and in the case of natural gas, pipeline transportation costs.

This concept of price convergence in final markets was dubbed “burner tip parity.” It has never really existed in practice, and for some very good reasons we will delve into below. First, let’s take a snapshot of one final market, New York.

Chart 1: Fuel Price Comparison In New York



Natural gas competes with No. 2 heating oil for space heating purposes and with No. 6 fuel oil for industrial boiler fuel purposes. For sake of completeness, natural gas also competes with coal and nuclear fuels in the electric utility market, but both of those fuels tend to be priced on much stickier long-term contracts as opposed to daily markets.

For much of the period between 1991 and 2007, (Federal Energy Regulatory Commission Order 636 establishing a fully deregulated market for natural gas was not promulgated under April 1992) natural gas and fuel oil traded closely to one another. This was due in no small part to fuel oil often being priced off a formula referring to natural gas. Heating oil generally traded well over the price of natural gas prior to 2003, and then increasingly over natural gas into 2008. Any glance at Chart 1 should be enough to convince you fuel prices at the burner tip have been diverging, not converging with the passage of time.

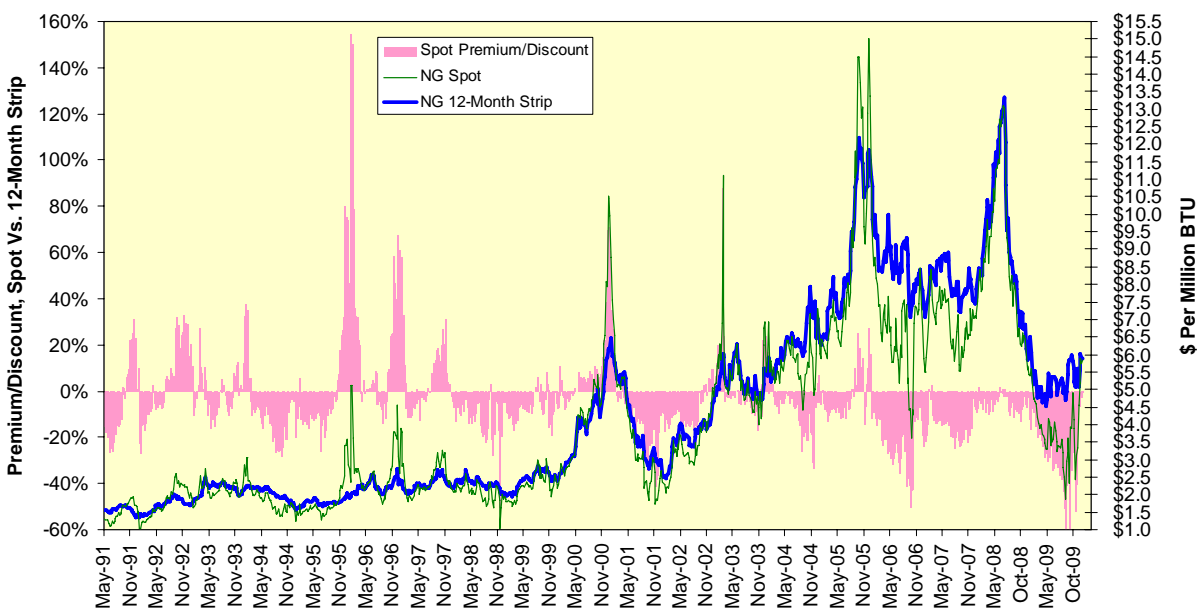
A dominant feature of Chart 1 is the price spikes for natural gas. Those spikes reflect the central problem for natural gas, and that is unlike petroleum products, it is not simple to store on-site and withdraw the fuel quickly from storage. Those spikes reflect either winter demand surges or in the case of 2004-2005 particularly, hurricane-related supply disruptions. It matters not: The most expensive BTU for any user is the one they needed and could not get. As many industrial customers of natural gas have “interruptibility” clauses in their contracts allowing the utility to interrupt their service and divert gas to residential users, those industrial customers find themselves short a call option on natural gas. As a result, natural gas is a less valuable fuel and thus finds itself priced lower in the final market.

As a corollary, anyone in the distribution network of natural gas who is able to build and operate a storage facility has what is known as a “real option.” The value of these facilities is related directly to the avoided price spikes over the expected time of the shortfall and rises and falls with the volatility of natural gas. A local distribution utility can operate one of these, as can some large customers. Anyone else who tries it is a candidate for a Darwin Award.

Curves You Cannot Ignore

A second reason traders who focus on front-month crude oil futures versus front-month natural gas futures are condemned to get the wrong answer is they are focusing on something commercials do not, and that is just one month of delivery. A large buyer of natural gas, say a fertilizer or chemical manufacturer, needs to protect costs over a longer period of time, and that means a strip price. While these can extend for several years or longer, we can illustrate the problem in Chart 2 simply by comparing the spot price for natural gas against a 12-month strip price. The argument is the same for crude oil as well.

Chart 2: Natural Gas Spot To Strip Relationship



Spot natural gas prices have tended to trade below strip prices since mid-2001. One reason is the prevalence of hedging by large fuel buyers after a series of price spikes in the late 1990s; they buy capping swaps and long-dated futures strips in months where there is precious little selling interest. Once that gas goes to delivery in a market with ample supplies, the spot price falls as the natural buyers were accounted for a long time ago.

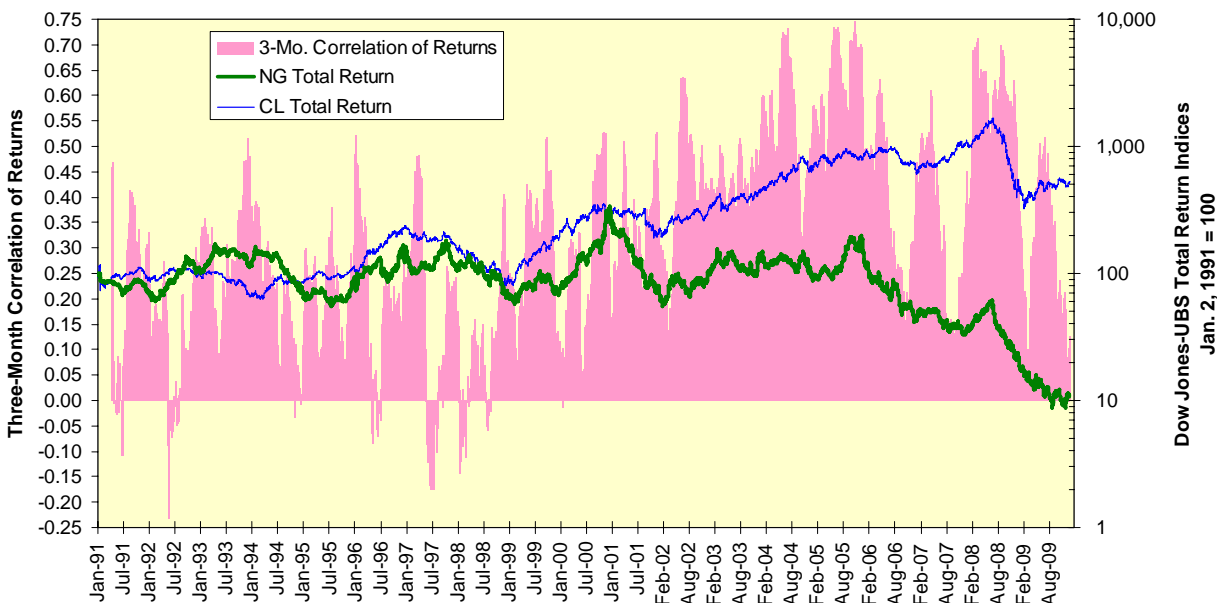
While crude oil can be stored at refiner sites reasonably cheaply and while crude oil imports can fall whenever supply rises, these outlets are less open for natural gas. As a result, the discount between front-month natural gas futures and front-month crude oil futures has moved into a situation where natural gas always looks “cheap” relative to crude oil.

The Role Of Index Speculators

The greater seasonality of natural gas and this tendency noted above for the front-month future to slip has made natural gas a horrific investment for the long-only commodity indexers and for ETFs such as the United States Natural Gas Fund (UNG).

If we map the total returns for the Dow Jones-UBS crude oil and natural gas series going back to January 1991 in Chart 3, we can see crude oil has been a fairly good investment; even after the huge plunge in the second half of 2008, the average annual return has been 8.39%. The average annual return on natural gas has been -11.40%, the sort of return that would earn an investment manager elsewhere a quick dismissal.

Chart 3: Crude Oil And Natural Gas As Index Investments



What is so remarkable about natural gas' horror show in Chart 3 is how it began after the huge run-up in commodity index fund investments in 2006. The more money piled into the front-month futures, the more market-makers had to buy the back months as a hedge. This contributed to the burgeoning discount of the front-month future. When the index funds came to sell their known quantities of front-month futures over a known window in time, they got mauled on the roll. Why anyone would invest in such an instrument is puzzling.

Stay Away

It is a compelling summation. Crude oil and natural gas increasingly are produced in different regions. Their final uses overlap only sparingly, and in the cases where they do, we can demonstrate how burner-tip parity is defeated by the short call option embedded in natural gas. Some final markets for natural gas, such as fertilizer manufacture and electricity generation are growing, and these largely are unlinked to crude oil. While imports of liquefied natural gas are growing, natural gas remains largely a North American regional market while crude oil is and has been a global market for decades.

The differences up and down overwhelm any similarities, and the limited substitution of one for another should define the spread between them as an unrelated spread. Still, the urge to trade the two against one another as a spread is extreme, and nothing said here will cool that ardor. But just because others make do something stupid...well, your mother could complete that sentence. This is a spread that is not and should be avoided.